US Army Corps of Engineers-Detroit

USACE 2008 Planning Community of Practice Conference

Vicksburg, MS

Sustainable CDFs Through Beneficial Use

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Engineer Research and Development Center

What is the Problem?

- Decreased use of aquatic placement
- Confined disposal facilities (CDFs) near or at capacity
- Declining space for new CDFs
- No placement option=no dredging

Solution: Beneficial Use

DREDGED SPOIL

(A waste, something bad)

DREDGED SOIL

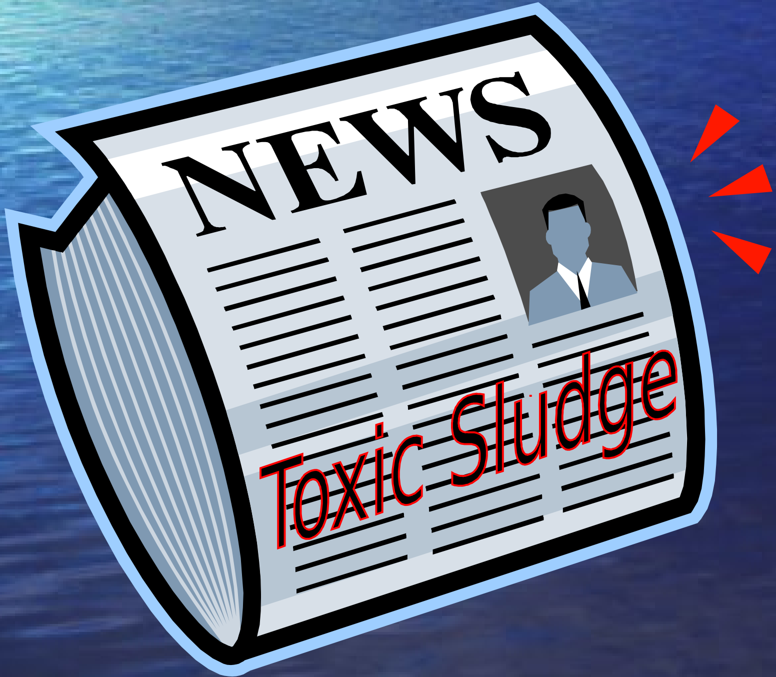
(A productive resource)

Formula for success

- Technically feasible
- Legal / regulatory concerns
- Public support
- Economics

What is the Issue?

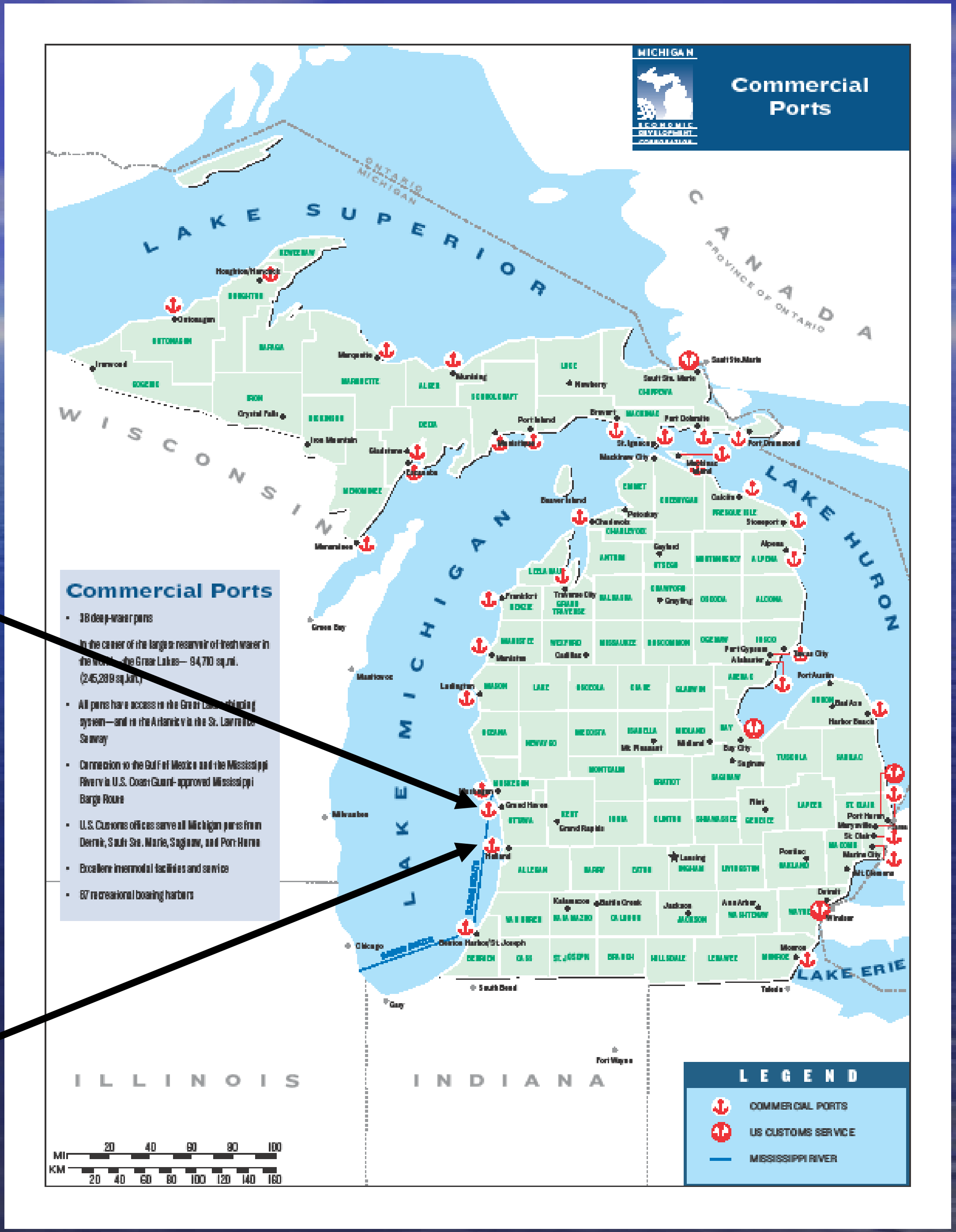
- Public perceptions
- Have to see it to believe it


NEWS
Toxic Sludge

US Army Corps of Engineers – Detroit

Grand Haven Harbor

Holland Harbor


MICHIGAN ECONOMIC DEVELOPMENT CORPORATION
Commercial Ports
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ERIE
CANADA
PROVINCE OF ONTARIO
ONTARIO MICHIGAN
WISCONSIN
ILLINOIS
INDIANA
Houghton/Hancock
Ontonagon
Marquette
Munising
Sault Ste. Marie
Escanaba
Gladstone
Menominee
Manistique
St. Ignace
Mackinaw City
Port Dolomite
Drummond
Charlevoix
Petoskey
Cheboygan
Rogers City
Stoneport
Alpena
Frankfort
Traverse City
Manistee
Ludington
Muskegon
Grand Haven
Holland
Benton Harbor/St. Joseph
Port Gypsum
Alabaster
Tawas City
Essexville
Bay City
Saginaw
Harbor Beach
Port Huron
Marysville
St. Clair
Marine City
Detroit
Windsor
Monroe
Toledo
Chicago
Milwaukee
Green Bay
Gary
South Bend
Fort Wayne
Grand Rapids
Lansing
Kalamazoo
Battle Creek
Jackson
Ann Arbor
Flint
Midland
LEGEND
COMMERCIAL PORTS
US CUSTOMS SERVICE
MISSISSIPPI RIVER
MI 20 40 60 80 100
KM 20 40 60 80 100 120 140 160

Commercial Ports

- 38 deep-water ports
- In the center of the largest reservoir of fresh water in the world—the Great Lakes—94,710 sq.mi. (245,289 sq.km.)
- All ports have access to the Great Lakes shipping system—and to the Atlantic via the St. Lawrence Seaway
- Connection to the Gulf of Mexico and the Mississippi River via U.S. Coast Guard-approved Mississippi Barge Route
- U.S. Customs offices serve all Michigan ports from Detroit, Sault Ste. Marie, Saginaw, and Port Huron
- Excellent intermodal facilities and service
- 87 recreational boating harbors

Maintenance Dredging

Outer harbor:

- Clean sand
- Accomplished annually
- Used for beach nourishment (Section 111)

Inner harbor:

- Intended to be accomplished tri-annually
- Material is not suitable for beach nourishment
- Existing dredged material has been classified by MDEQ as “inert”
- Large backlog quantities remain

Grand Haven Harbor, Michigan

Holland Harbor, MI

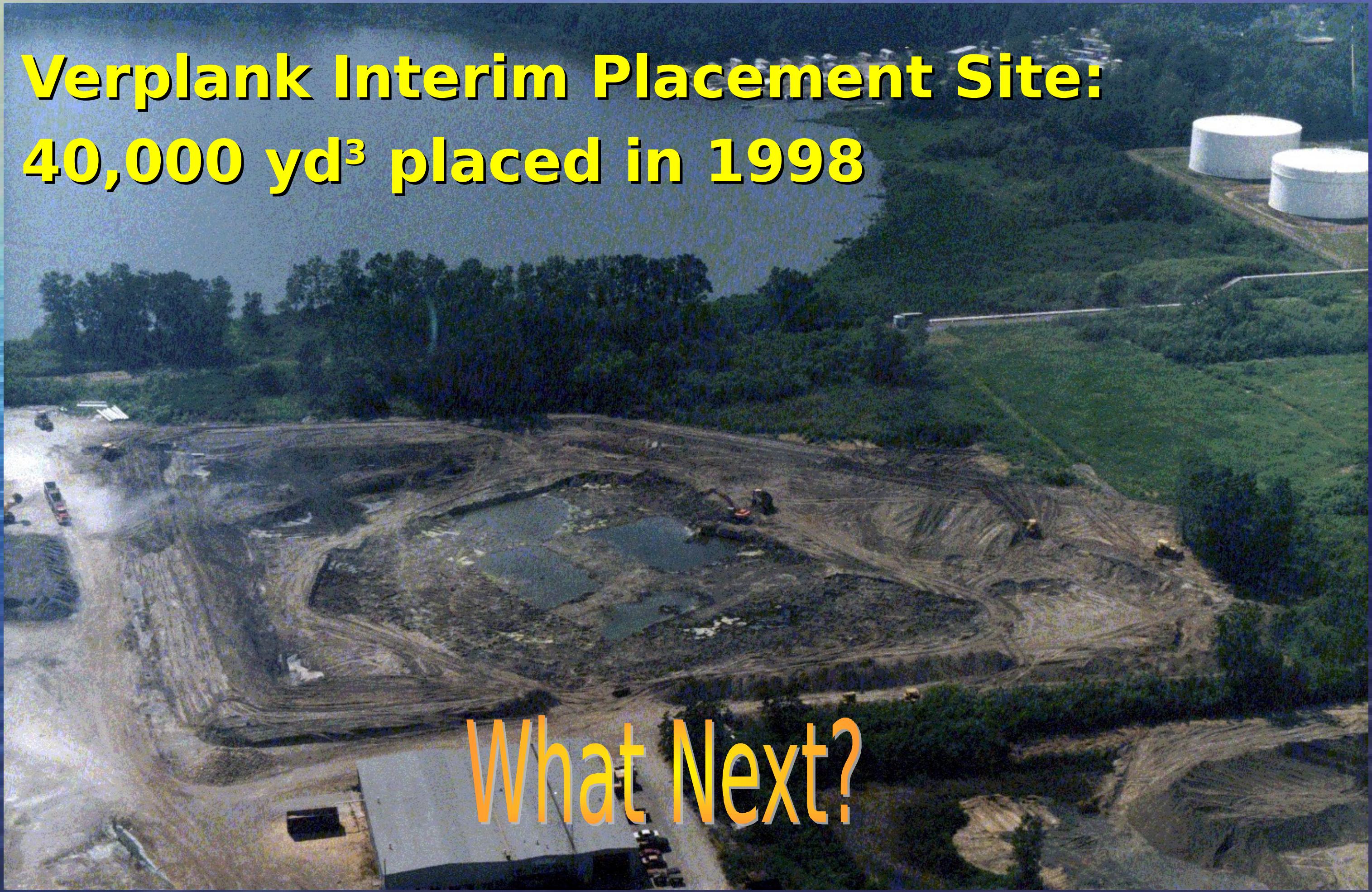
The Grand Haven Harbor Problem

- Harbor needs to be dredged to serve multiple customers, including municipal electric power

Harbor Island CDF "retired" in 1992

No space for new CDF construction

Interim Solution



Verplank Interim Placement Site:

40,000 yd^3 placed in 1998

What Next?

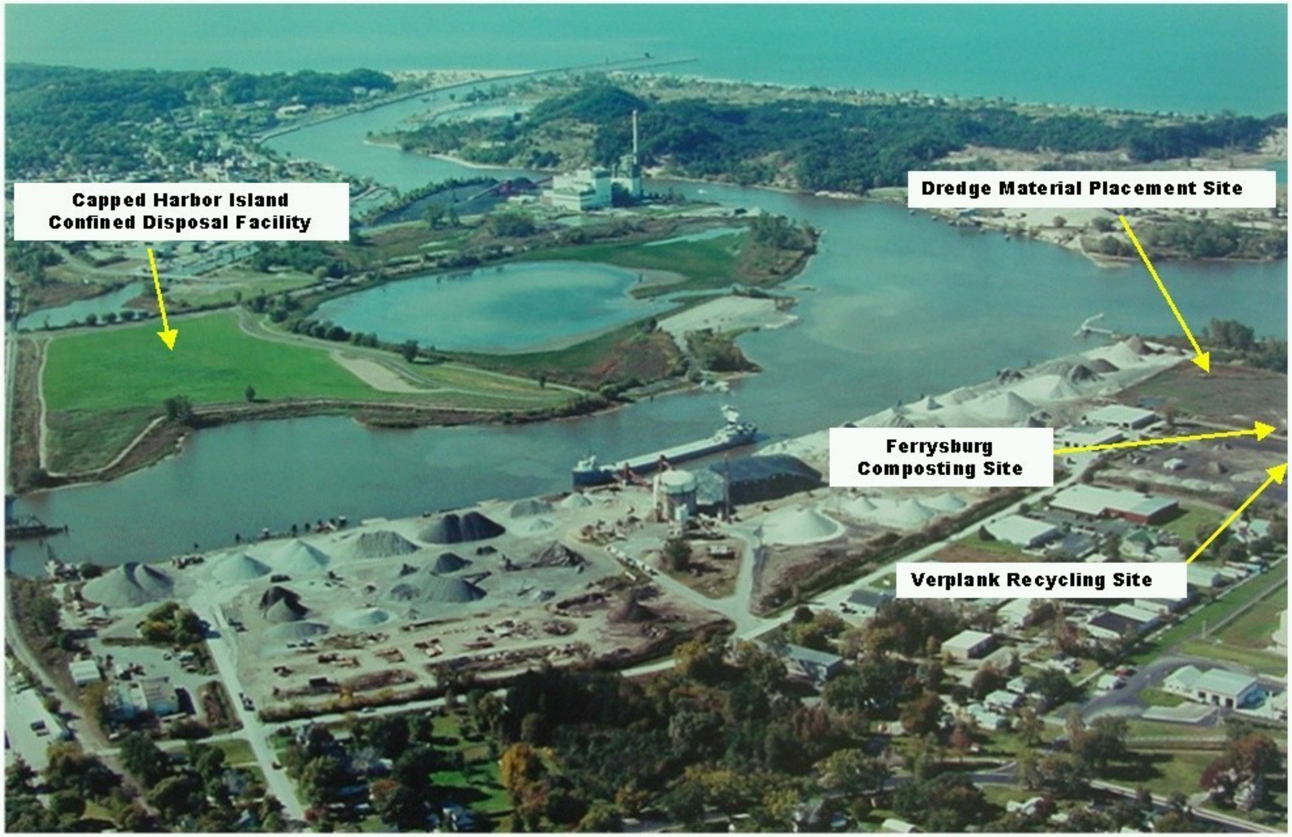
Community Involvement

Public Meetings

- Facts: No solution=no dredging=local economic impacts
- Stakeholder support=added emphasis
- Public interest in solutions

Sustainable Solution

Goal: Recycle 40K yd3 of dredged material between every 3-yr dredging cycle

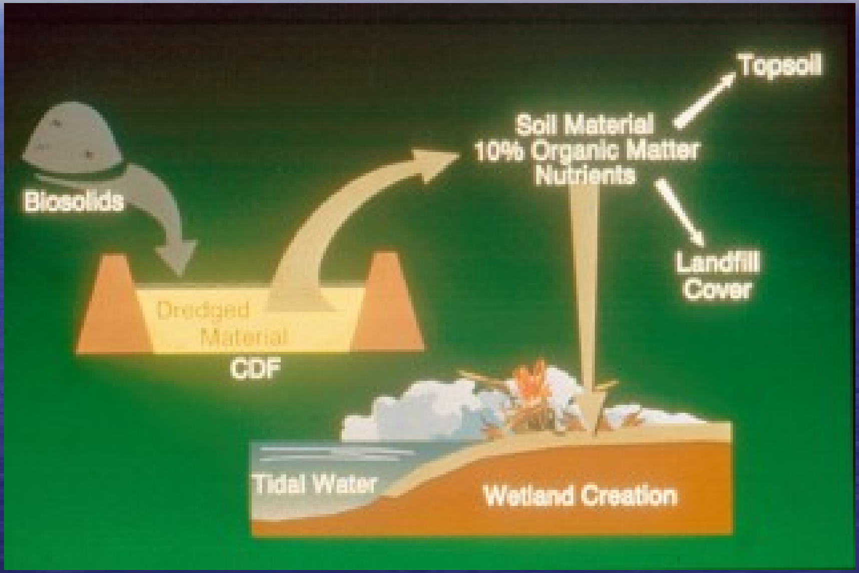

Capped Harbor Island
Confined Disposal Facility
Dredge Material Placement Site
Ferrysburg
Composting Site
Verplank Recycling Site

Verplank Dock & Facility
Grand Haven, Michigan

Photo taken approximately 1999

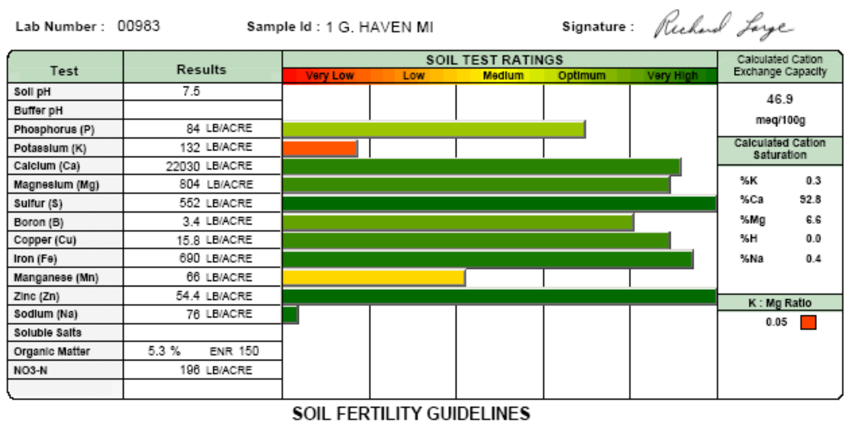
Topsoil Creation from Dredged Material

- Previous ERDC research had demonstrated development of topsoil products using dredged material and waste products including yard wastes and biosolids
- Approach – Evaluate available resources and combine to create a better product


Biosolids
Dredged Material
CDF
Soil Material
10% Organic Matter
Nutrients
Topsoil
Landfill Cover
Tidal Water
Wetland Creation

USACE/DOER Program Funded Demonstration Project

- **Greenhouse study conducted 2003-2004**
  - **90% dredged material + 10% leaf litter compost**
- **On-site pilot test conducted**
  2004 with
  Dock Co
- **9K yd^3**



Lab Number : 00983   Sample Id : 1 G. HAVEN MI   Signature :

Test	Results
Soil pH	7.5
Buffer pH	
Phosphorus (P)	84 LB/ACRE
Potassium (K)	132 LB/ACRE
Calcium (Ca)	22030 LB/ACRE
Magnesium (Mg)	804 LB/ACRE
Sulfur (S)	552 LB/ACRE
Boron (B)	3.4 LB/ACRE
Copper (Cu)	15.8 LB/ACRE
Iron (Fe)	690 LB/ACRE
Manganese (Mn)	66 LB/ACRE
Zinc (Zn)	54.4 LB/ACRE
Sodium (Na)	76 LB/ACRE
Soluble Salts	
Organic Matter	5.3 % ENR 150
NO3-N	196 LB/ACRE

SOIL TEST RATINGS
Very Low
Low
Medium
Optimum
Very High

Calculated Cation Exchange Capacity
46.9
meq/100g

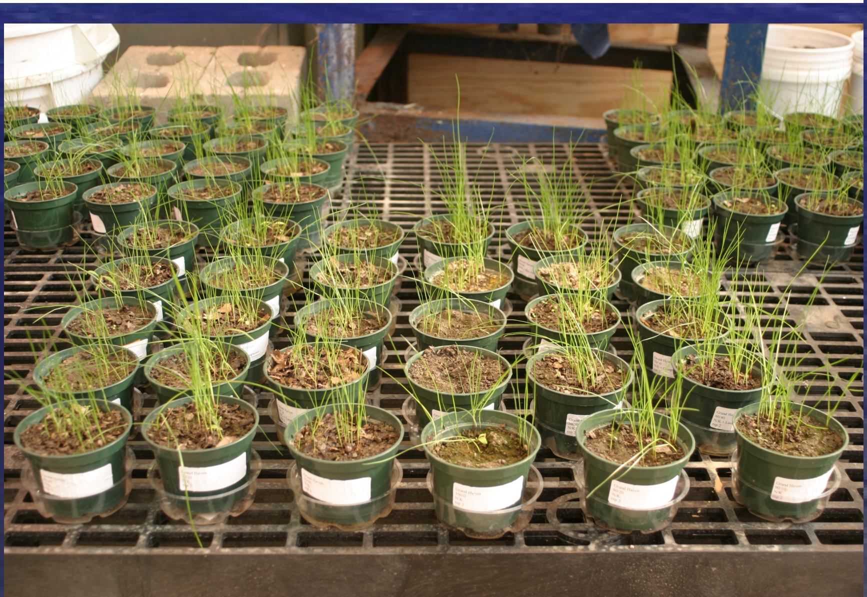
Calculated Cation Saturation

%K	0.3
%Ca	92.8
%Mg	6.6
%H	0.0
%Na	0.4

K : Mg Ratio
0.05 🟥

SOIL FERTILITY GUIDELINES

Balloon Flower
Balloon Flower
Balloon Flower

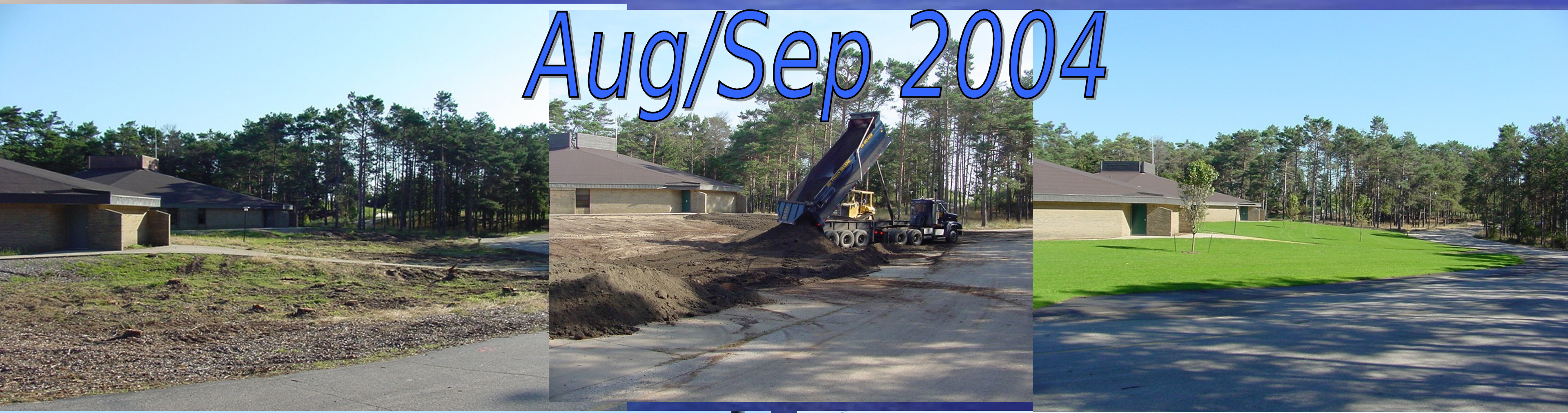


Public Demonstration

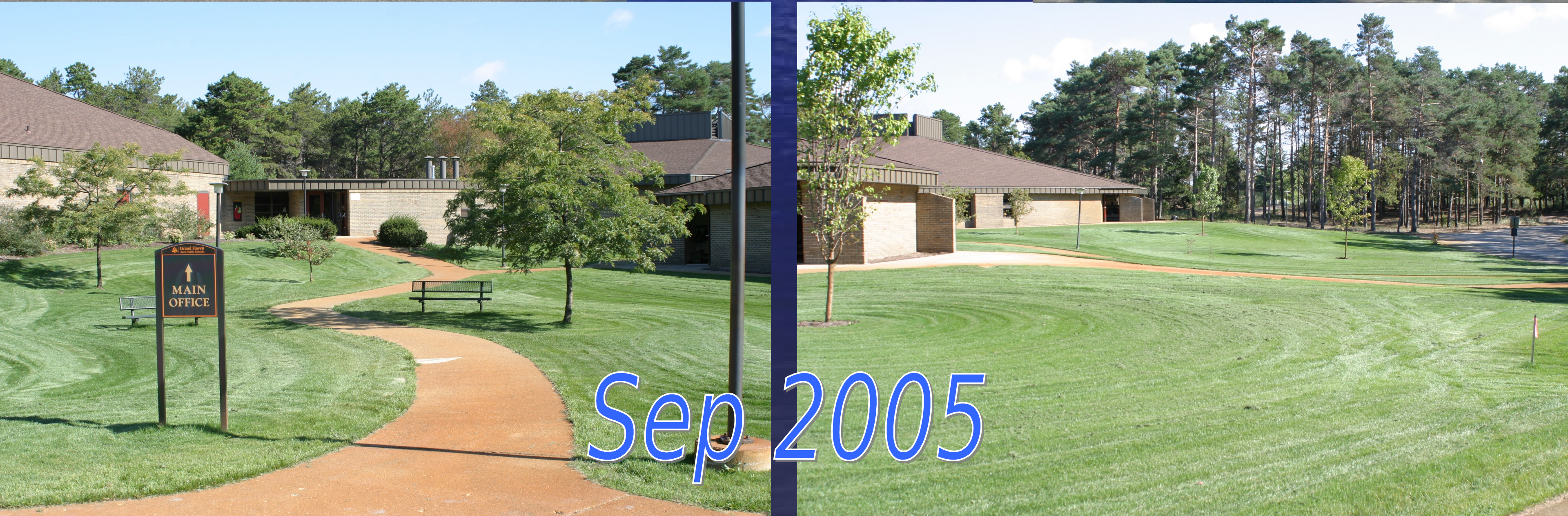
Participants

- Tri-County Chamber of Commerce
- Mayors of Ferrysburg, Spring Lake and Grand Haven
- US Congressional Representative
- Michigan DEQ
- Grand Haven School District
- Board of Power and Light
- USACE – Detroit
- USACE – ERDC Vicksburg
- Local Press

Pilot Demonstration:
Lake Hills Elementary School



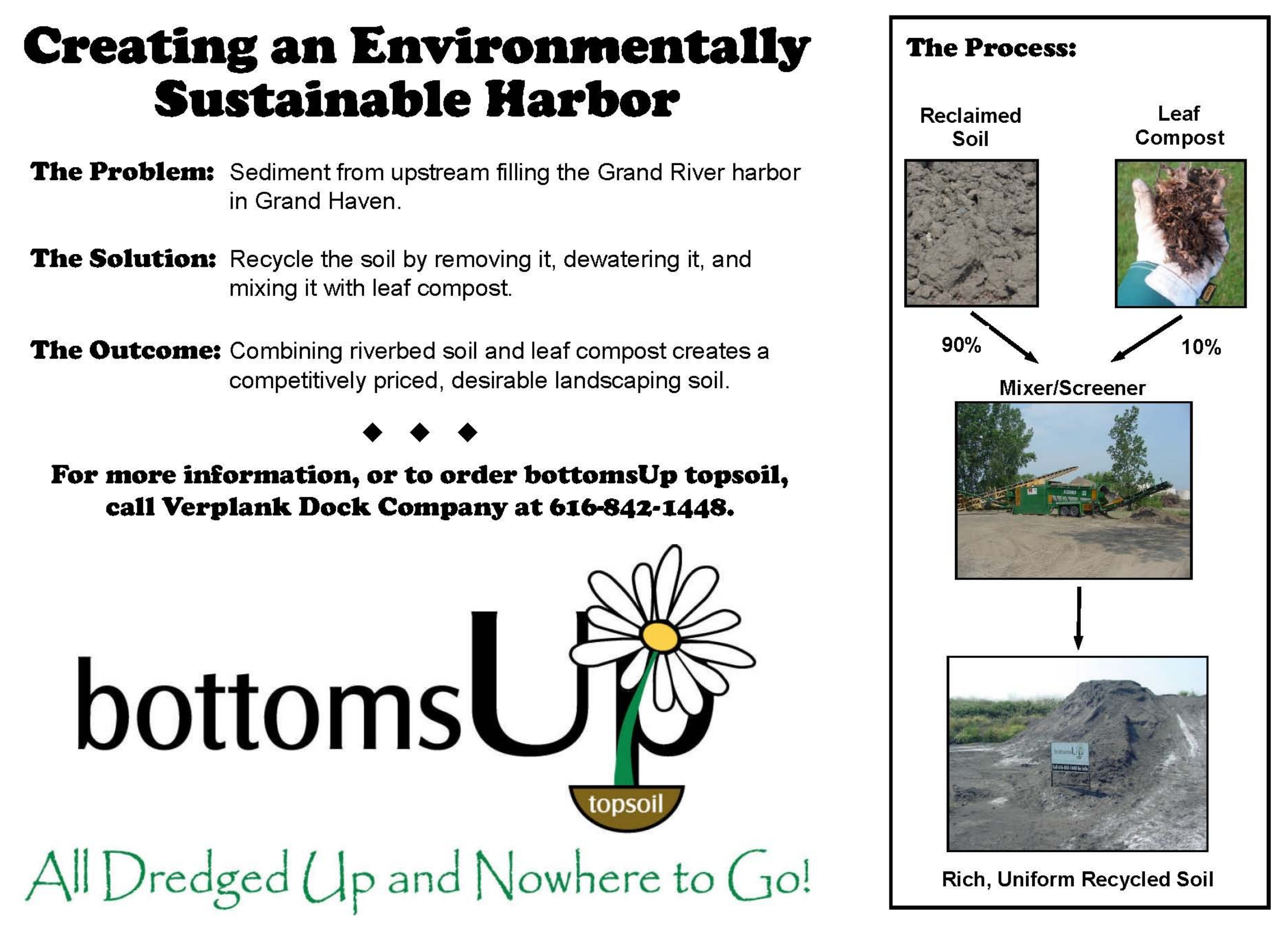
Aug/Sep 2004



MAIN OFFICE

Sep 2005

Result – A Marketable Product



Creating an Environmentally Sustainable Harbor

The Problem: Sediment from upstream filling the Grand River harbor in Grand Haven.

The Solution: Recycle the soil by removing it, dewatering it, and mixing it with leaf compost.

The Outcome: Combining riverbed soil and leaf compost creates a competitively priced, desirable landscaping soil.

◆ ◆ ◆

For more information, or to order bottomsUp topsoil, call Verplank Dock Company at 616-842-1448.

bottomsUp
topsoil

All Dredged Up and Nowhere to Go!

The Process:

Reclaimed Soil

Leaf Compost

90%

10%

Mixer/Screener

Rich, Uniform Recycled Soil

Community Support

The Benefits:

- Using **bottomsUp topsoil** supports Great Lakes vessel transportation, which is the most environmentally sound and fuel efficient means of moving bulk cargo in the Great Lakes region.
- Using **bottomsUp topsoil** eliminates the need to strip topsoil from one property in order to place it on another.
- Using **bottomsUp topsoil** supports municipal leaf composting efforts, as an alternative to leaf burning.
- **bottomsUp topsoil** is pre-screened, resulting in a more uniform product than many other bulk soils.
- The cost of **bottomsUp topsoil** is comparable with other commercially available topsoils.

◆ ◆ ◆

To order bottomsUp topsoil, call Verplank Dock Company at 616-842-1448.

bottomsUp topsoil

All Dredged Up and Nowhere to Go!

A Collaborative Project Involving:

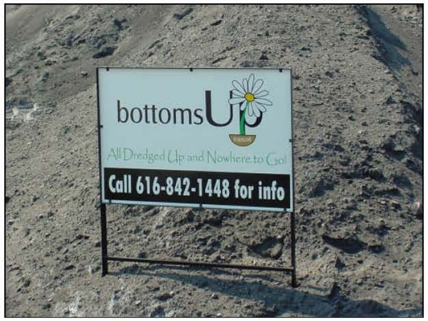
- U.S. Army Corps of Engineers
- Verplank Dock Company
- The Chamber —
  Grand Haven
  Spring Lake
  Ferrysburg
- Grand Haven Board of Light & Power
- Local Units of Government, including:
  City of Grand Haven
  City of Ferrysburg
  Village of Spring Lake
  Grand Haven Charter Township
  Spring Lake Township
- Construction Aggregates, Meekhoff Lakeside Dock, and other commercial harbor users.
- AND, purchasers of **bottomsUp topsoil**

US Army Corps of Engineers

the Chamber Grand Haven Spring Lake Ferrysburg

Board of Light & Power Grand Haven

Solving Community Problems with Recycled Dirt: *The Grand River Harbor Story*



Available in West Michigan from Verplank Dock Company. Call 616-842-1448 for information.

Continued Use and Current Status

- **Aproximately 35K yd^3 produced and sold for \$8-10/ yd^3**
- **Mostly residential & landscaping**
- **US-31 median work**
- **Additional 40,000 yd^3 dredged in 2006 and placed in interim site**
- **Interest in bagged soil for store sales**

bottomsUp
topsoil
All Dredged Up and Nowhere to Go!
Call 616-842-1448 for info

Continued marketing is the key to sustainability

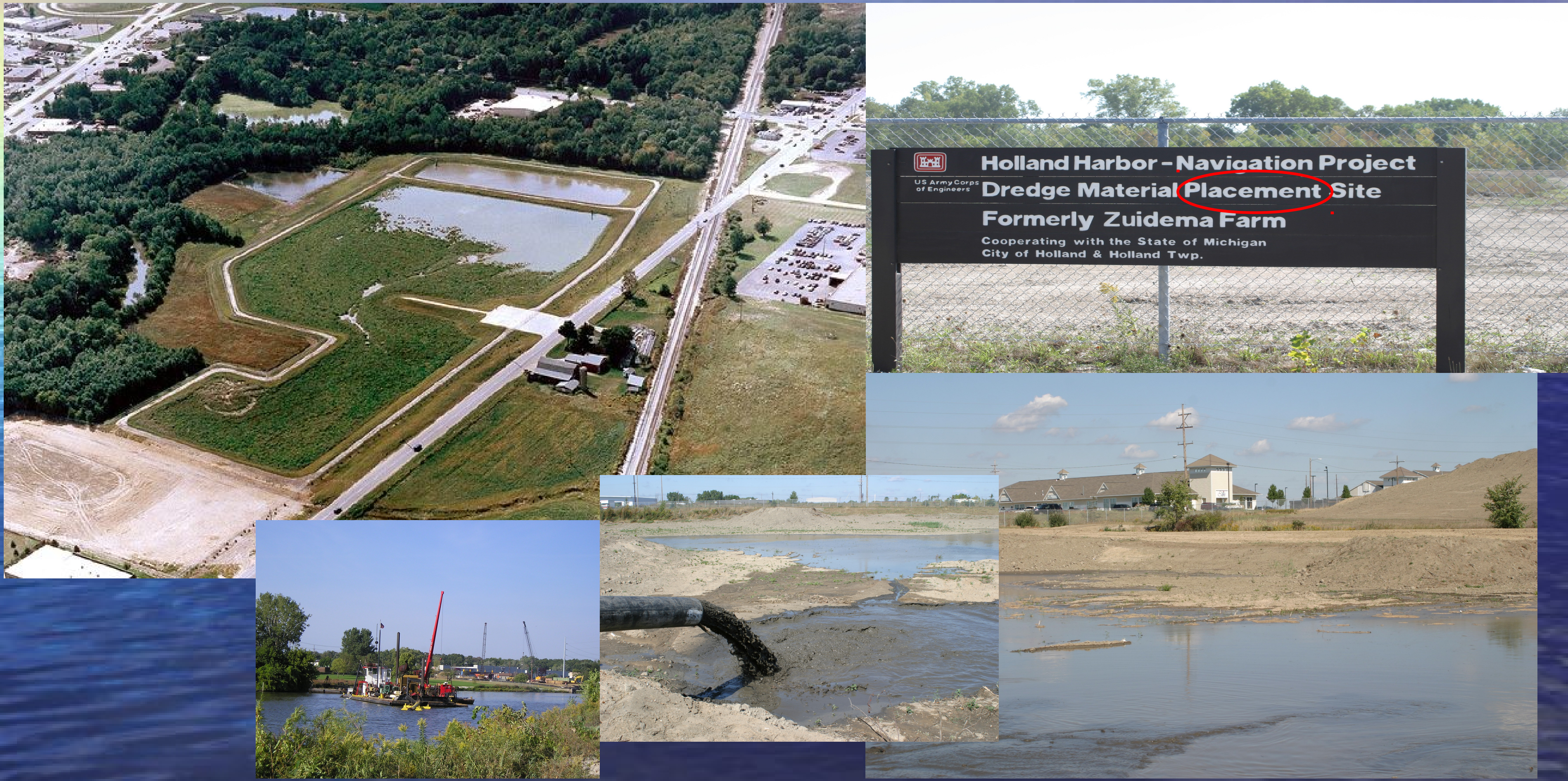
Holland Harbor

Problem: Find a site or don’t dredge

Solution: Mobilize the community

- Locals purchased land for placement
- 2-1/2 miles upstream of Harbor
- Designed for placement, dewatering and reuse
- Berms can be raised as needed
- City keeps “title” to the material; either sells or uses for fill/cover/other reuse

Lakewood DMPS


Holland Harbor – Navigation Project
US Army Corps of Engineers
Dredge Material Placement Site
Formerly Zuidema Farm
Cooperating with the State of Michigan
City of Holland & Holland Twp.

Fully sustainable solution- can be used

The Holland Solution

Keys to making Holland a success:

- Community leaders were involved
- Citizens were kept informed
- Brainstorming was promoted
- Government officials were proactive
- The "problem" became the "solution"

Key Take-Home Points

- **Think ‘Outside the Box’**
- **‘Resource’ – Not ‘Spoil’**
- **Seeing is believing**

Questions?

Beneficial Uses of Dredged Material http://el.erdc.usace.army.mil/dots/budm/budm.cfm